



HYPER 63

Maintenance , Operating & Service Manual

DHD360



Certificate Number 2446/00
ISO9001

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1.INTRODUCTION

The Bulroc **Hyper 63** down the hole hammer is a strong and robust tool of a simple and straight forward design to provide maximum performance with a minimum of maintenance.

Please Note:

The **Hyper 63** series use bits that have footvalves.

BULROC **Hyper 63** hammers are supplied as standard with a check valve arrangement which is designed to maintain the pressure inside the hammer when the air is switched off and so help prevent contaminated water from entering the hammer.

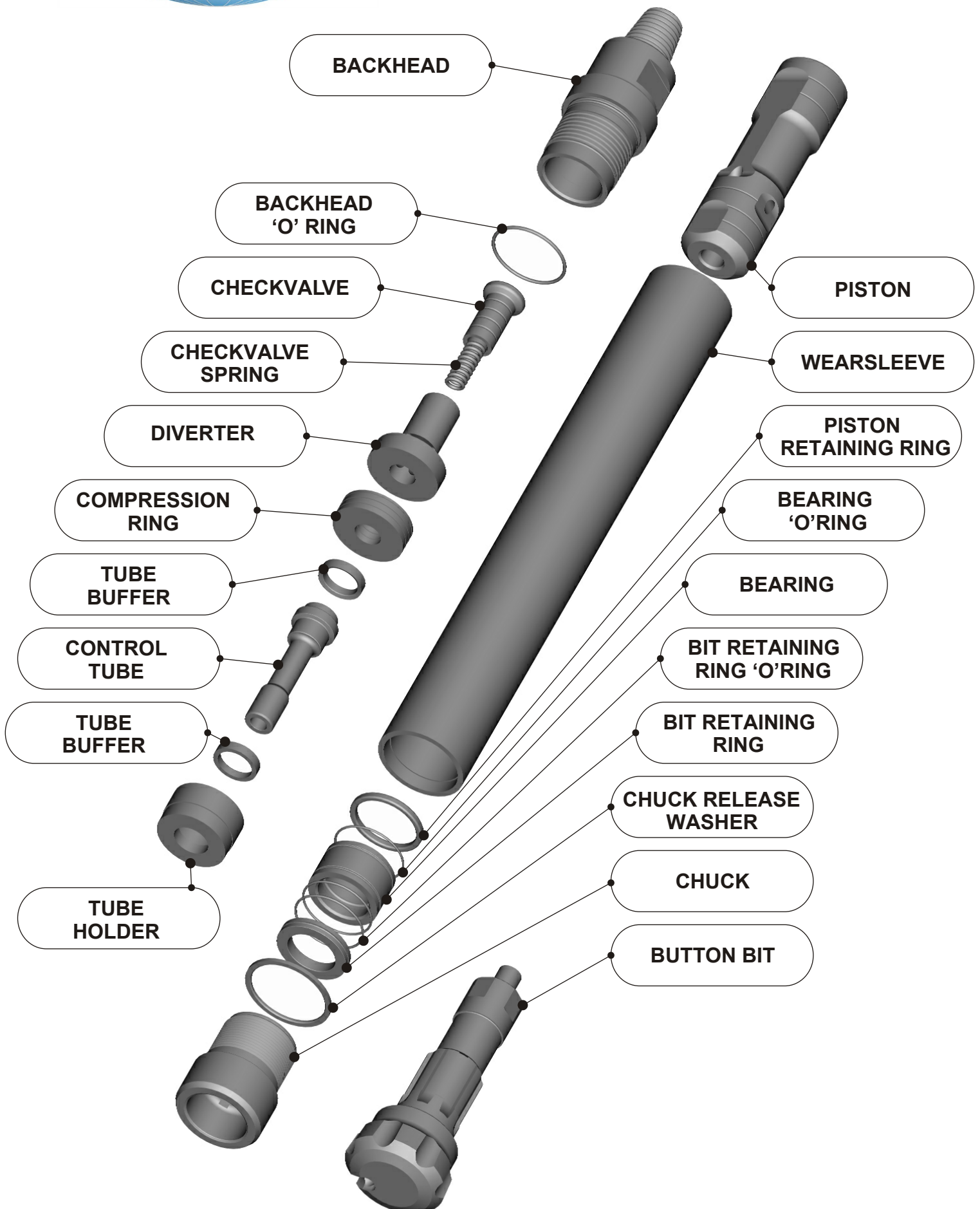


ALWAYS THINK SAFETY FIRST!

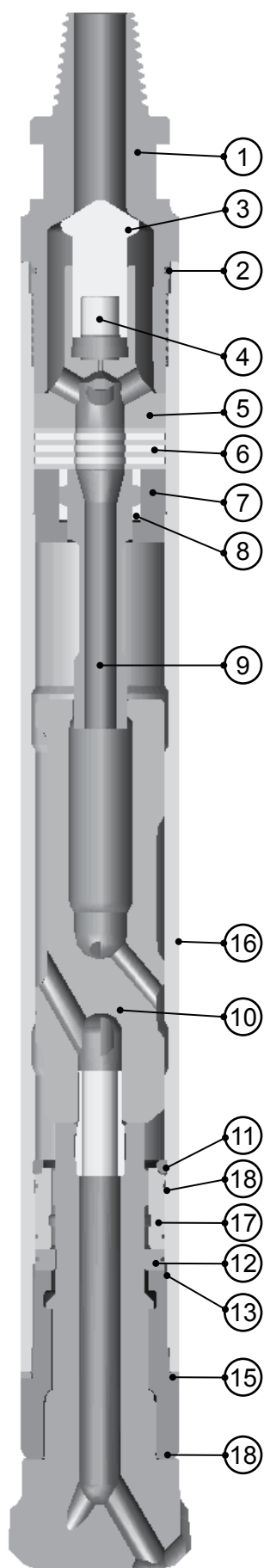
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HYPER 63/DHD 360



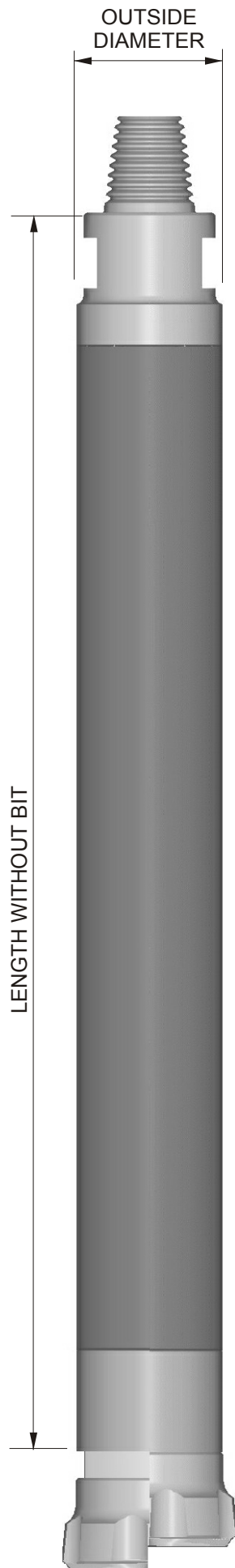
3. HAMMER PARTS



Hyper 63 Valveless Hammer

Ref	Description	Part Number
1	Backhead	HSH633803M
2	Backhead 'O' Ring	HSH6114
3	Check Valve	IPRCV04
4	Check Valve Spring	IPRCVS04
5	Diverter	HSH6120
6	Compression Ring	HSH6128
7	Tube Holder	HSH6131
8	Tube Buffer (2)	HSH6129
9	Control Tube	HSH6330
10	Piston	HSH6103
11	Piston Retaining Ring	HSH6132
12	Bit Retaining Ring	HSH6337093
13	Bit Retaining 'O'Ring	HSH6137A093
14	Chuck	HSH6335093
15	Chuck Release Washer	HSH6326
16	Wearsleeve	HSH6300
17	Guide Bush	HSH6386
18	Guide Bush 'O'Rings(2)	HSH6386A
	Complete Hammer	BR63H01

4. HAMMER SPECIFICATIONS

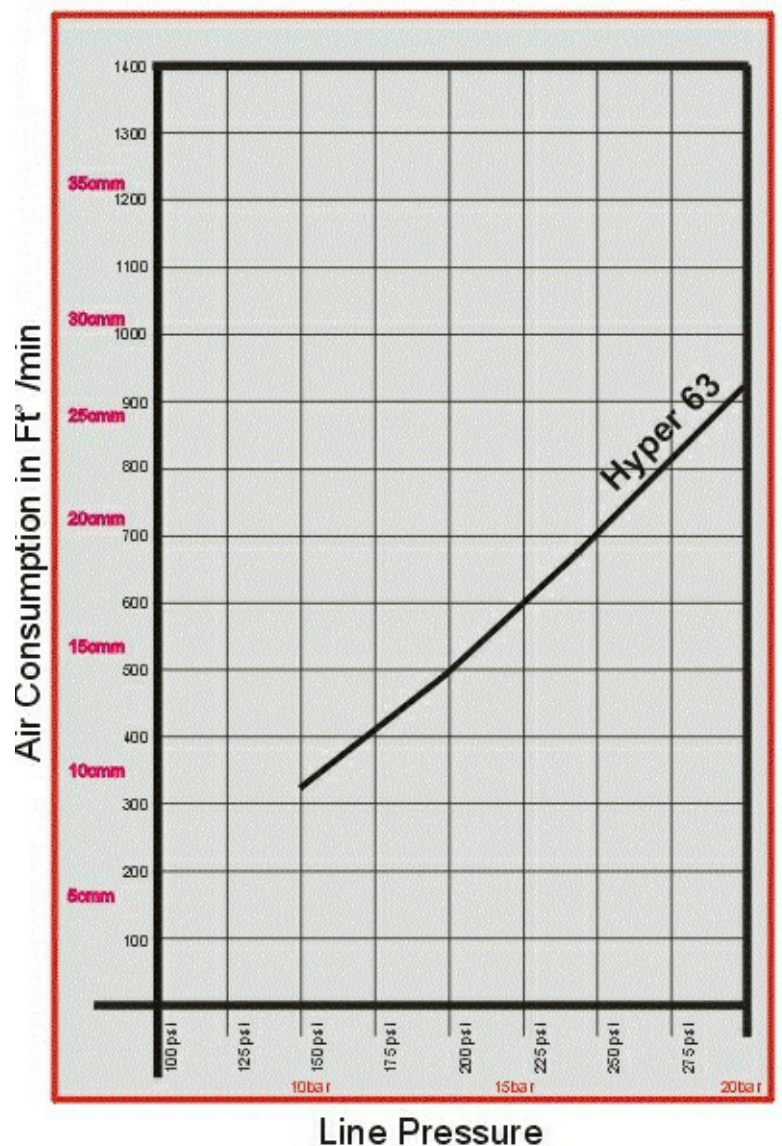


H63 HAMMER SPECIFICATIONS

	English	Metric
Weight (less bit)	216 lbs	98.1 kgs
Length (less bit)	48.6"	1235 mm
Outside Diameter	5.62"	142.8 mm
Piston Weight	49.0 lbs	22.3 kgs
Stroke	4.25"	108mm

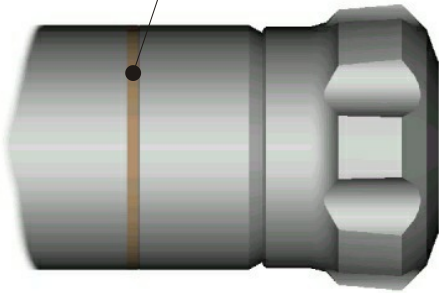
AIR CONSUMPTION

P.S.I	BAR	C.F.M	Cu.Mtr/min
150	10.3	264	9.6
200	13.8	522	14.8
250	17.2	730	20.7
350	20.7	958	27.1

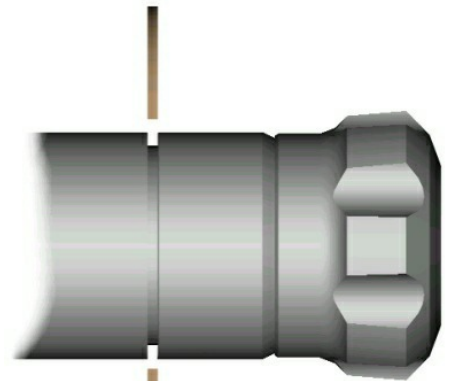


5. STRIPPING THE CHUCK ASSEMBLY

Breakout Washer



After extensive drilling, the chuck might become too tight to loosen on a Bulroc Bench Splitter or the drill rig. If this problem occurs the breakout washer can be ground or drilled out, which will relieve the pressure and enable the chuck to be removed.



(NB On no account should the wearsleeve be impacted by a hand hammer. Splitting should not be assisted by the use of localised heat i.e. Blow torch.)



Assuming now both the Chuck and Backhead threads have been loosened either on the drilling rig, or a hammer splitter. The stripping procedure is as follows.

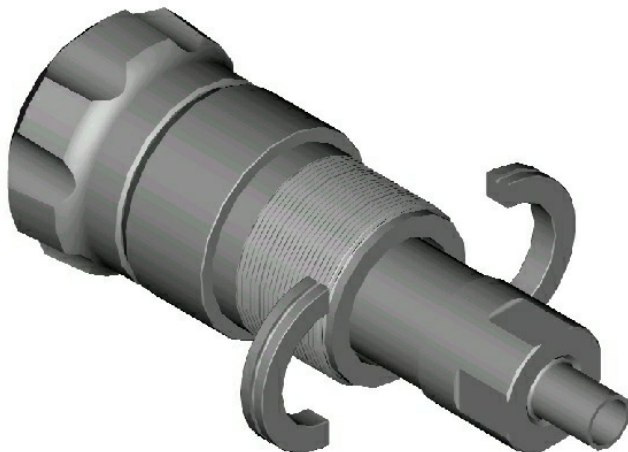


1. Remove the chuck assembly

2. The bearing can now be removed. Inspect both 'O' rings for damage.



3. Removing the 'O' Ring from the bit retaining ring will allow this to be removed. Alternatively pulling the two pieces apart will allow the 'O' ring to stretch enough to fit over the end of the bit shank.



4. The bit can now be removed quite easily.

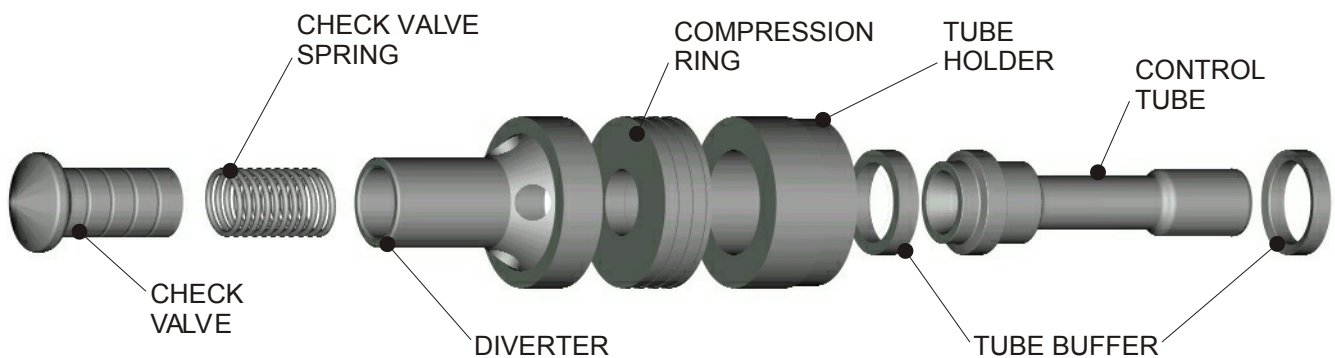


6. STRIPPING THE BACKHEAD ASSEMBLY

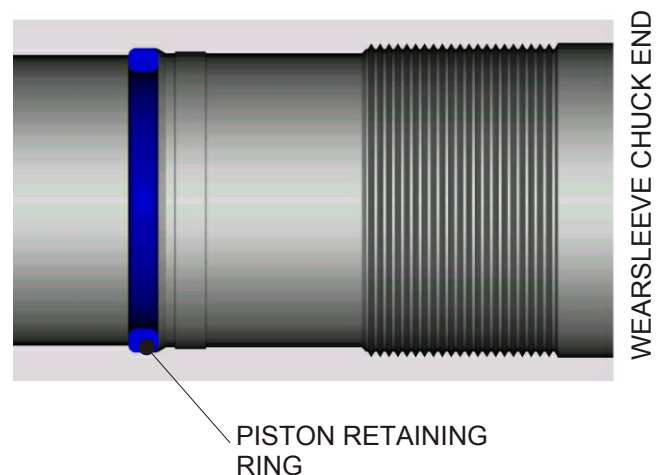


1. With the hammer laid horizontal, unscrew the backhead and remove it from the wearsleeve.

2. The remaining assembly can best be removed by lifting the chuck end of the wearsleeve, which will allow the piston to push the other parts up to the end face. From where they can be removed by hand.



3. The backhead assembly can now be split quite easily.



4. Unless there is damage to the piston retaining ring, there should be no need to remove it.

However if this should need replacing, dropping an inverted piston down the upright wearsleeve from the backhead end, should remove it.

7. CHECKING FOR WEAR OR DAMAGE

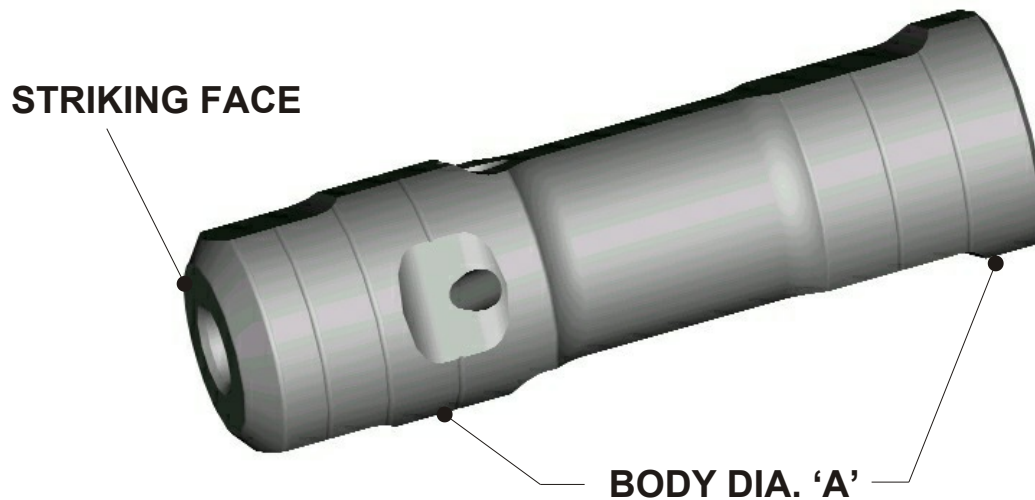
Premature wear to internal parts is a result of either:-

1. Incorrect or insufficient lubrication.
2. The ingress of debris into the hammer.
3. Incorrect service and storage.

The maximum wear allowances shown in this section are a guide as to when to replace parts. In certain conditions parts may need to be replaced before they reach the sizes shown.



PISTON



1. There are two main areas to examine on a used Piston. Check the Body diameter 'A' for signs of 'Pick-up' and heat-caused discolouring (both are signs of poor lubrication.) Using a micrometer, measure the diameter and refer to the table for the minimum size.

Any light 'Pick-up' marks can be removed by using emery cloth, however if there are signs of overheating and cracking, the Piston should be replaced and the lubrication system examined.

HAMMER	MINIMUM DIA. (A)
HYPER63	4.575" (116.21mm)

2. Secondly, examine the Striking Face. Distortion is acceptable providing there are no signs of cracking. Burrs and dents can be removed with an emery stone.

7. CHECKING FOR WEAR OR DAMAGE

MAINTAINING THE PISTON

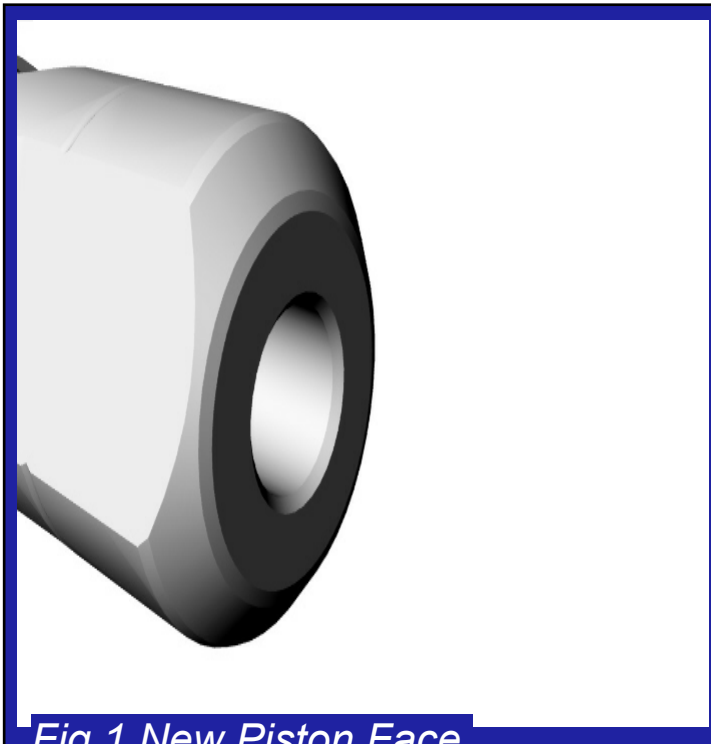


Fig. 1 New Piston Face

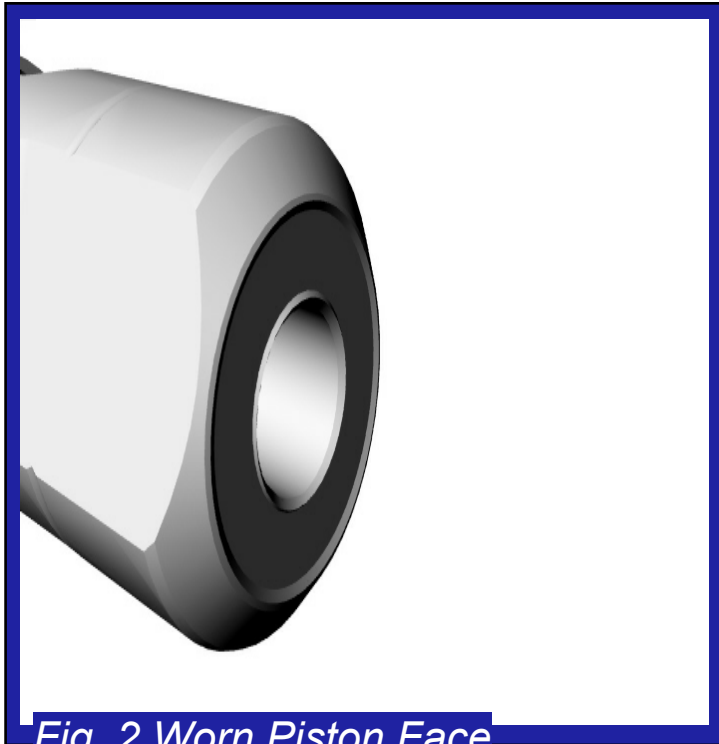


Fig. 2 Worn Piston Face

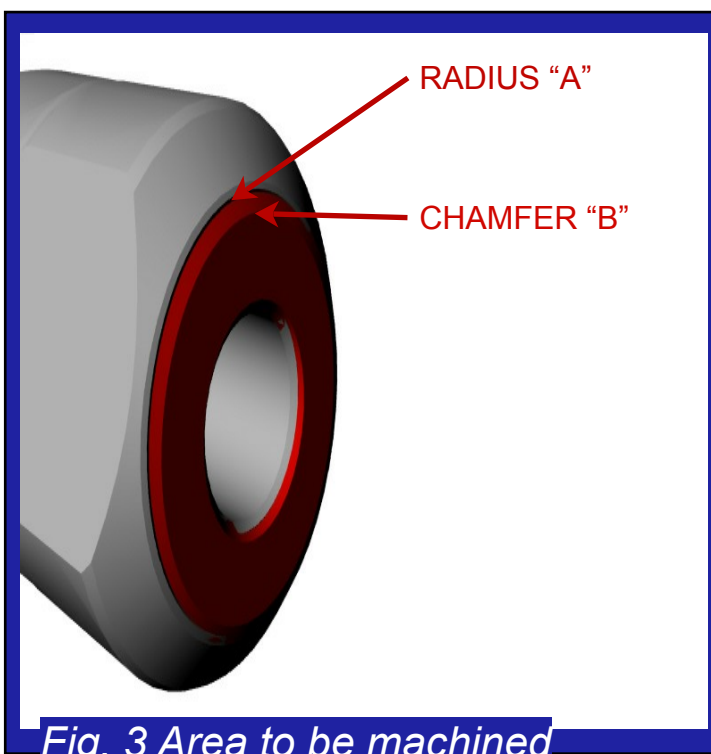


Fig. 3 Area to be machined

During the working life of the hammer the Striking Face on the Piston may become dented or deformed (see *fig.2*). To prevent this face from cracking, or chipping, the Piston should be returned to a lathe where the striking face can be re-machined flat and then have the outer radius and inner chamfer reformed (see *fig.3*).

Care should be taken to remove the minimum amount of material during this re-machining process and at no point should more than 2mm be removed from the face. **Pistons with wear patterns, or indentations deeper than 2mm should be replaced.**

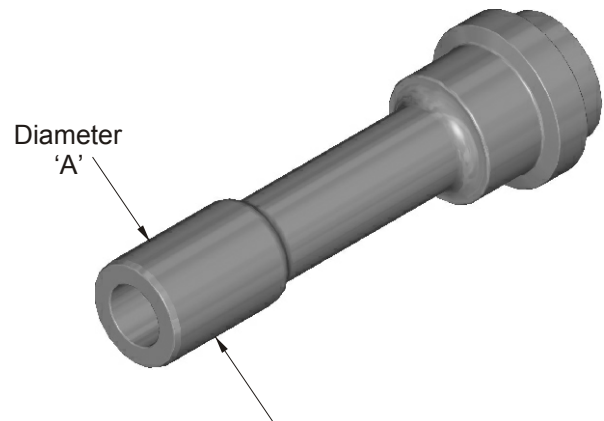
The table below contains useful machine information for reforming the piston face.

MACHINE DETAIL		
HAMMER	RADIUS "A"	CHAMFER "B"
HYPER 63	0.125"	0.060" @45

8. CHECKING FOR WEAR AND DAMAGE

CONTROL TUBE

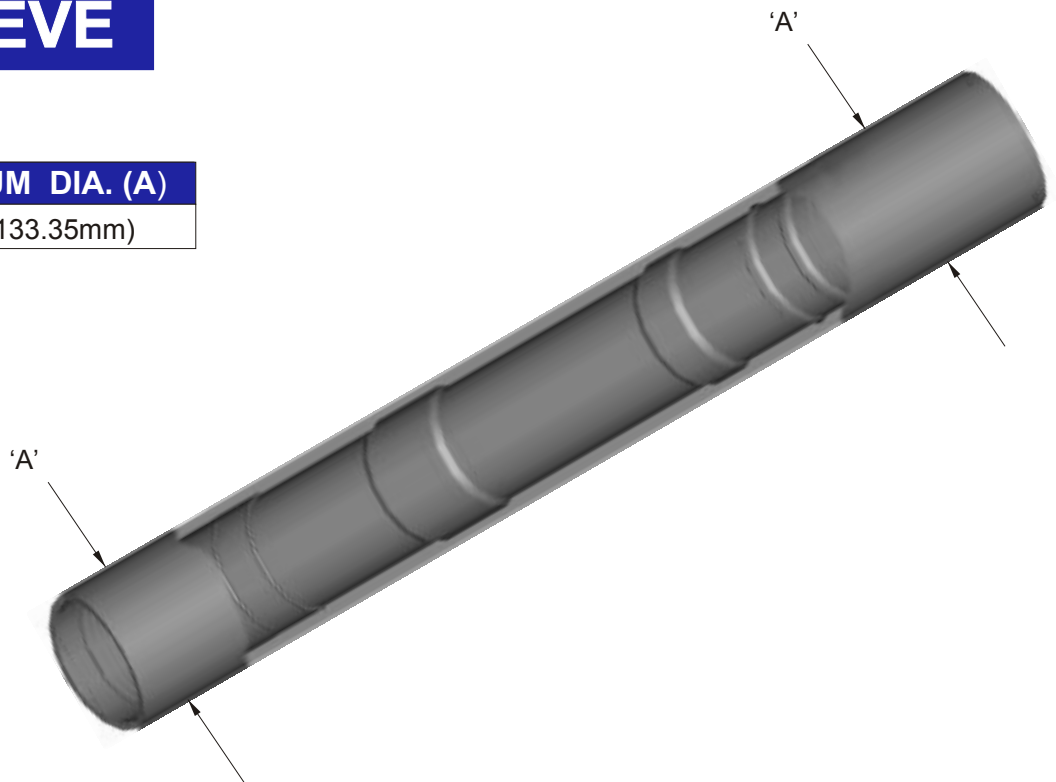
HAMMER	MINIMUM DIA. (A)
HYPER63	1.875" (47.62mm)



Examine the control tube dia 'A', using a micrometer, check the diameter has not worn under the specified minimum. If there are signs of 'pick up' they should be removed by using emery cloth.

WEARSLEEVE

HAMMER	MINIMUM DIA. (A)
HYPER63	5.25" (133.35mm)

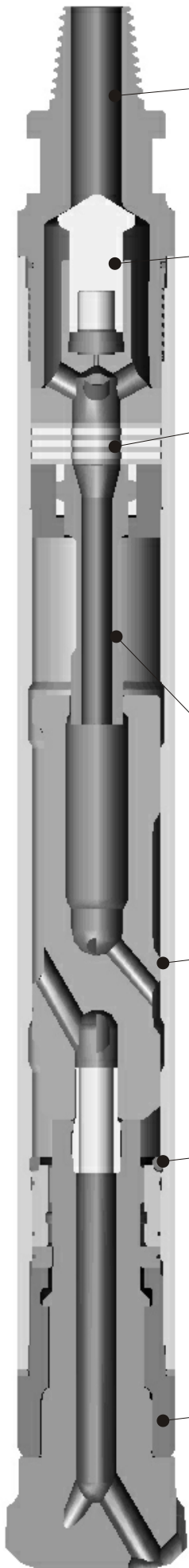


Using either a micrometer or a vernier, measure the outer diameter 'A' of the Wearsleeve. If it is below the minimum it must be replaced. The wear rate of the Wearsleeve can be slowed by replacing the Chuck before the wear area reaches the Wearsleeve.

The bore of the Wearsleeve should be periodically checked for any signs of 'Pick-up'. If a Piston has broken within the Wearsleeve it is imperative that the bore is honed to remove any Burrs or 'Pick-up'. Failure to do so will result in 'Pick-up' on the replaced Piston and will lead to early failure of this component.



9. REBUILDING THE HAMMER



8.Backhead

7.Checkvalve
Assembly

6.Compression
Ring

5.Control
Tube Assembly

4. Piston

2. Piston
Retaining Ring

3.Chuck
Assembly

1. Ensure all maintenance work outlined in the previous sections have been carried out.

2. Stand the wearsleeve on the floor, with the chuck end upwards. Insert the piston retaining ring into the bore, and hammer the ring down until it springs into the groove in the wearsleeve.

3. Clamp the wearsleeve horizontally in a vice, taking care not to overtighten the jaws. Assemble the chuck, chuck release washer, and bit retainers. (ensure you fit a new 'O'ring). Slide the bearing over the shank, ensuring the correct orientation. (see diagram on the left), ensure you again fit new 'O'rings. Cover the threads with a copper based grease.

4. Coat the piston with rock drill oil and slide it into the backhead end of the wearsleeve. Ensure the piston striking face enters first.

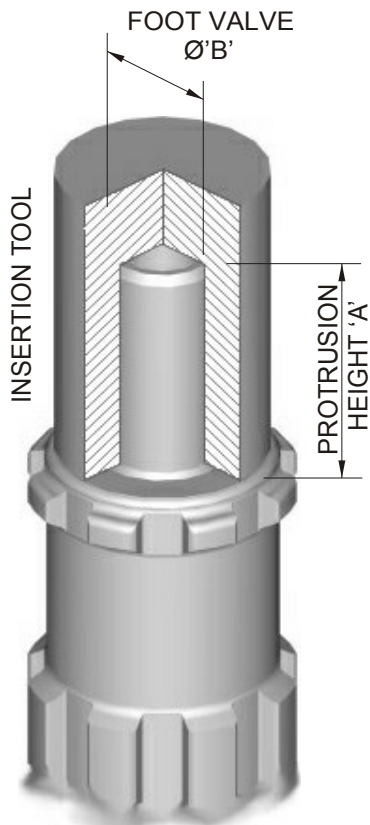
5. Assemble the two control tube buffers around the control tube and the push the assembly into the tube holder. Coat the outside of the assembly with rock drill oil, and insert it into the backhead end of the wearsleeve.

6. Slide the compression ring on to the control tube assembly.

7. Insert the spring and the check valve into the diverter, and push the whole assembly into the wearsleeve. Until it reaches the compression ring.

8. Fit a new 'O'ring to the backhead and coat the threads in copper based thread grease. Screw the backhead into the wearsleeve until it is fingertight. Then measure the gap between the wearsleeve face and the lock-up face on the backhead. This gap should be a minimum of 1mm. If the gap is smaller, the assembly should be removed and a new compression ring should be fitted. If the gap is greater than 1mm, the back head should be fully tightened using an appropriate backhead spanner.

10. BUTTON BIT FOOTVALVES



Bulroc Hyper Hammers are designed to be used with footvalves.

The correct footvalve must be fitted otherwise the performance of the hammer will be seriously affected. Using a footvalve which is larger in diameter than specified will result in the rapid failure of the footvalve.

Using a footvalve which is smaller in diameter than the size shown will greatly reduce the performance of the hammer.

The protrusion height is also important and to ensure the correct height and prevent damage when replacing the footvalve, it is recommended that the correct insertion tool



	INSERTION TOOL	PROTRUSION HEIGHT 'A'	FOOTVALVE DIA. 'B'	SHANK TYPE
HYPER63	FVIT093	1.940" (49.3mm)	1.500" (38.1mm)	DHD360

11. LUBRICATION

The Hyper 63 piston oscillates at 1000 bpm at 150 psi (10bar). It is therefore extremely important that an adequate supply of the correct type of rock drill oil is constantly fed to the hammer whilst it is operating.

Failure to do so will quickly lead to excessive component wear and if the oil supply is cut off for any reason, the piston will quickly seize inside the wearsleeve, resulting in irreparable damage to both components.

An air line lubrication system should be installed, preferably on the drill rig. The lubricator reservoir should be of sufficient capacity to supply the required volume of rock drill oil for a full shift. With larger hammers, this may be impractical but the capacity should be sufficient for at least half a shift.

This is equally important that the lubricator system must be adjustable and have a visual check to ensure the lubricator does not run out of oil.

As a good general guide, all Bulroc Hyper hammers require a third of a pint of oil per hour, per 100cfm of air through the hammer (0.07 litre per metre cubed)

***Eg Hyper 63 operating at 150psi = 328cfm = 1.27 pints per hour
10.3bar = 9.31cmm = 0.72 litre per hour***

The amount of lubricating oil should be increased by 50% when drilling with water or foam.

When new drill pipes are added to the drill string, it is recommended that a half pint (a quarter of a litre) of rock drill oil is poured into the pipe to provide a good internal coating and helps prevent the hammer from running dry at any time. The grade of rock drill oil will be determined by the ambient temperature at the drilling site. If the ambient temperature is between 0 and 25 degree centigrade, then a 30 grade oil should be used. If the ambient temperature is greater than 25 degree centigrade, use a 50 grade oil. Bulroc supply their own recommended rock drill oil and this is detailed below, together with other brands of suitable oils.

MAKE	MEDIUM SAE 30 ISO VG 100	HEAVY SAE 50 ISO VG 220
BULROC	T220	T320
BP	ENERGOL RD-E 100	ENERGOL RD-E 300
CHEVRON	ARIES 100	ARIES 320
SHELL	TORCULA 100	TORCULA 320
ESSO/EXXON	AROX EP100	AROX EP320

12. HYPER HAMMERS STORAGE

We recommend following these points listed below when removing a 'Down the Hole Hammer from service. This will ensure trouble-free operation once the hammer starts work again.

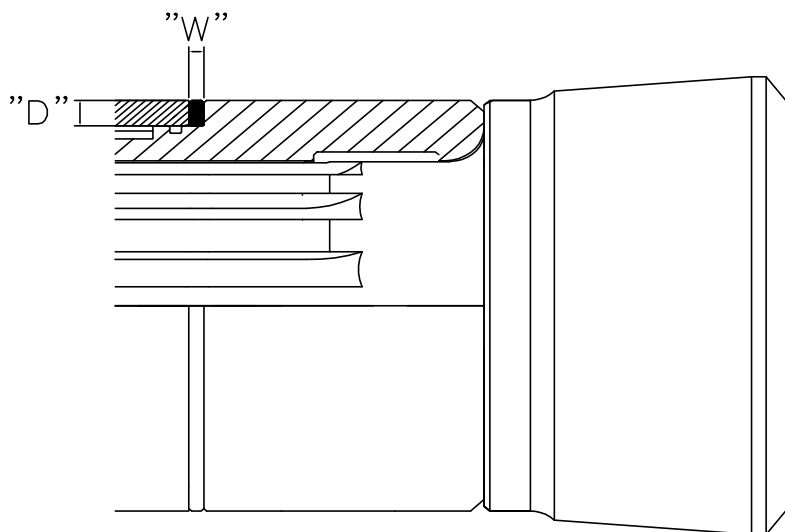
The hammer should be stripped and cleaned, and freed of as much water/ moisture as possible. Bulroc T220 or similar rock drill oil should be poured into the backhead allowing all parts to be coated throughout the hammer. Amount required for a Hyper 63 is $\frac{3}{4}$ of a pint or 0.43 litre. Both ends of the hammer should be then covered to prevent the ingress of dirt, etc. It should then be laid horizontally in a dry environment ready for use next time

If this procedure is followed then apart from protecting the hammer from corrosion it will protect the parts from premature wear, and of course reduce 'down time' and eventual repair costs. However we strongly recommend that the hammer, especially if stored for any long period of time should be stripped, cleaned, inspected and re-oiled prior to use to be sure of smooth drilling..

13. TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
INOPERATIVE DRILL	Drill bit blowholes blocked	Unblock holes
	Dirt inside drill	Strip and clean drill
	Worn or damaged parts	Replace damaged parts
	Insufficient lubrication	Check oil level, adjust lube needle value
	Excessive lubrication	Adjust lube needle value
	Hanging Piston	Piston stuck. Polish out the score marks
	Insufficient air pressure	Check compressor discharge and increase to operational value
SLOW PENETRATION	Insufficient air pressure	Increase discharge pressure
	Dull drill bit	Re-grind or change bit
	Worn drill parts	Replace worn parts
	Too much or too little lubrication	Check oil level and if necessary adjust lube needle value
	Dirt in drill	Strip and clean
LOW RETURN AIR VELOCITY	Insufficient hole flushing air passing through hammer	Drill or increase hole size through the piston
	Drill bit exhaust holes blocked	Clean out blockage
SPASMODIC OPERATION	Failed or damaged parts	Overhaul drill
	Lack of oil	Check lubrication
	Drill bit broken	Replace bit
	Dirt in drill	Strip and clean

A. CHUCK RELEASE WASHERS



CHUCK RELEASE WASHERS		
HAMMER MODEL	"W"	"D"
HYPER 63	0.310" - 7.87mm	0.295" - 7.49mm

Chuck Release Washers are fitted to the Bulroc Range of Hyper Hammers to assist the removal of the Chuck from the Wearsleeve after drilling.

The Chuck Release Washer is manufactured from a composite material that reduces the friction between the lock up faces on the Chuck and Wearsleeve making it easier to overcome the tensional loading applied to these parts during the drilling process.

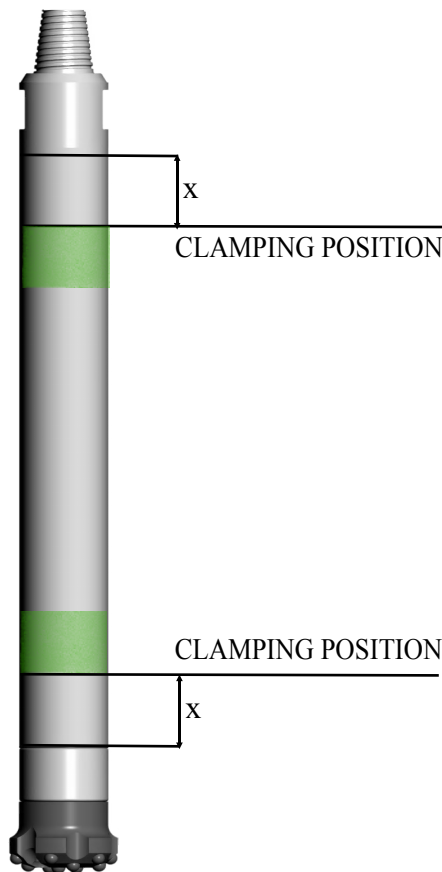
Due to the forces applied to the Chuck Release Washer you may find that its thickness ("W") is reduced during the drilling cycle and it is therefore recommended that a new Washer be fitted each time the Chuck is removed.

It is possible that on some of the larger Hammers in the Bulroc range, when drilling with large diameter Button Bits or Overburden Systems, certain conditions can generate higher torques than normally expected, resulting in difficulties when trying to remove the Chuck from the Wearsleeve. Should this occur then the removal of the Chuck can be achieved by cutting away the Chuck Release Washer. We do however stress at this point that cutting away the Chuck Release Washer is a final option and should not be done until all other options have proved unsuccessful.

If the cutting away of the Chuck Release Washer is necessary for the removal of the Chuck then it must be done with extreme care to avoid damage to either the Chuck or the Wearsleeve. The composition of the Chuck Release Washer allows for it to be cut with either a hacksaw or a small hand grinder equipped with a slitting wheel. The hacksaw method is much safer and less likely to damage the Chuck or Wearsleeve, but obviously much slower than the hand grinder with a slitting wheel. To remove the Chuck Release Washer a cut must be made in the centre of the washer all the way around its circumference, and completely through the Washer, thus transforming the single washer into two thinner washers that will then spin freely. Great care must be taken, especially if the Washer is cut with a slitting wheel, to ensure that the cut only penetrates the Washer and does not pass through into the body of the Chuck.

The size shown as 'D' in the above table should be your MAXIMUM depth of cut, and it is recommended that either the saw blade or the slitting wheel are marked in some way so as to indicate when they have achieved this depth.

B. CLAMPING POSITIONS



CLAMP POSITIONS	
HAMMER MODEL	"X" DISTANCE FROM WEARSLEEVE END FACE
Hyper 63	7.750" / 197mm

There are many different "Splitting" Machines available for unscrewing the threaded connections on a Bulroc Hyper Hammer, some are attachments to the Drill Rig, others are independent hydraulic units, or purpose made Bench arrangements. Regardless of which machine is chosen they all require some method of securing the Wearsleeve whilst applying a torque to either the Chuck or Backhead.

The most common machines use either Clamps or Chains around the O/D of the Wearsleeve and the positioning of these is very important, if they are placed too close to the joint being "Split" they will in effect increase the frictional forces on the threaded connection making it impossible to unscrew the component from the Wearsleeve.

The above table shows the correct position for the clamping mechanism to ensure no additional load will be applied to the threaded connection, thus making the joint easier to split.

Due to the high torque loads applied to a Hammer during its drilling cycle, equally high loads are required to "Split" the Chuck and Backhead away from the Wearsleeve and because of this the clamping arrangement around the Wearsleeve must generate enough friction to prevent it from spinning during the process. However great care must be taken to make sure the clamps or chains are not over-tightened as this can cause deformation to the Wearsleeve that can result in both Wearsleeve failure and Piston seizure once the Hammer is returned to service.

To help increase the Wearsleeve's resistance to deformation it is recommended that the Hammer Piston is first slid to the end of the Hammer being "split", before clamps or chains are attached. By doing this the Piston O/D will limit the amount of deformation in the Wearsleeve bore if too much clamping pressure is applied.

NOTE:

The use of Chain type Hydraulic Breakers can leave deep intrusions in the O/D of the Wearsleeve which may result in stress concentrations that could lead to premature failure of the Wearsleeve.



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